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CP-201700802
TXX-17082

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Ref 10 CFR 50.73

10/27/17

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT
DOCKET NO. 50-446
MANUAL REACTOR TRIP DUE TO TWO DROPPED RODS

Dear Sir or Madam:

Enclosed is Licensee Event Report (LER) 446/17-002-00, "Manual Reactor Trip Due to Two Dropped Rods" for Comanche Peak Nuclear Power Plant (CPNPP) Unit 2.

This communication contains no new licensing basis commitments regarding Comanche Peak Unit 2. Should you have any questions, please contact Mr. Ken Vehstedt at (254)897-6296.

Sincerely,

John R. Dreyfuss

Enclosure

c- Mr. Kriss Kennedy, Region IV
Ms. Margaret O'Banion, NRR
Resident Inspectors, CPNPP

IE22
NRR

NRC FORM 366 (04-2017) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE

Manual Reactor Trip Due to Dropped Rods

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
09	01	2017	2017	002	00	10	27	2017	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☑ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
100	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Ken Vehstedt	(254) 897-6296

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	AA	JS	West.	Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☑ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On September 1, 2017 CPNPP Unit 2 was manually tripped by Control Room Operators due to two dropped rods. All safety systems responded as designed including the automatic start of the Auxiliary Feedwater System. The proximate cause of the dropped rods was a high resistance condition on a single phase of a three phase fusible knife switch in a Rod Control System Power cabinet. Subsequent third party cause analysis was unable to determine the root cause of the high resistance condition. The defective switch was replaced. Additional corrective actions to avoid recurrence have been entered into the CPNPP Corrective Action Program.

All times below are in Central Standard Time (CDT).

I. DESCRIPTION OF THE REPORTABLE EVENT

At time 2140 [CDT] on September 1, 2017, CPNPP Unit 2 experienced two (2) dropped rods, one control, one shutdown. The reactor was then manually tripped. The Auxiliary Feedwater system automatically started as expected.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

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Comanche Peak Nuclear Power Plant Unit 2	05000- 446	2017	- 002	- 00

NARRATIVE

A. REPORTABLE EVENT CLASSIFICATION

The event is reportable under 10 CR 50.73(a)(2)(iv)(A) "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section." The system which was manually actuated was the Reactor Protection System (RPS). The Auxiliary Feedwater System (AFW) automatically started as designed due to low-low steam generator water level following the trip.

B. PLANT CONDITION PRIOR TO EVENT

At 2140 on September 1, 2017 CPNPP Unit 2 was operating in Mode 1 at approximately 100% rated thermal power.

C. STATUS OF STRUCTURES, SYSTEMS, OR COMPONNETS THAT WERE INOPERABLE AT THE START OF THE EVENT AND CONTRIBUTED TO THE EVENT

There were no structures, systems, or components which were inoperable prior to the event which contributed to the event. Prior to the actual rod drops, the fusible disconnect switch discussed below was performing its design function.

D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES

At time 2140 [CDT] on September 1, 2017, CPNPP Unit 2 experienced two (2) dropped rods, one control, one shutdown. The reactor was then manually tripped by the control room operators. The time difference between the two rod drops was approximately fifteen (15) to thirty (30) seconds. All safety systems responded as designed.

The initial troubleshooting determined the disconnect switch for the Stationary Coils of Rod Control Power Cabinet 2-2BD caused the rods to drop. Further investigation determined the cause of the rod drops was a high resistance connection on the "A" phase of the Rod Control Power Cabinet 2-2BD stationary coil three-phase fusible disconnect switch [EIIS:(AA)(CAB)(JS)]. The switch was replaced and and the reactor started up on September 4.

E. THE METHOD OF DISCOVERY OF EACH COMPONENT OR SYSTEM FAILURE, OR PROCEDURAL PERSONNEL ERROR

Initial indication of rod drop was provided to the Control room operator by an annunciated alarm. Operators confirmed rod drop through Tavg/Tref alarms and lowering of primary pressure. The reactor was manually tripped approximately one minute after the initial rod dropped (times as indicated by the plant computer).

II. COMPONENTS OR SYSTEM FAILURES

A. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE

A third-party failure analysis identified damage to the "A" phase switch knife blade and its associated receiver clip. The "B" and "C" phase knife blades and clips were undamaged and provided no indication as to the cause of the failure of the "A" phase knife blade and clip. All that could be determined was that the "A" phase switch knife blade and clip experienced heat which resulted in a high resistance connection. That high resistance connection resulted in a voltage drop that was sufficient to cause the stationary coils of two control rods to release their control rods, dropping them into the core.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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B. FAILURE MODE, MECHANISM, AND EFFECTS OF EACH FAILED COMPONENT

The three-phase fusible disconnect switch is used primarily to provide isolation to equipment requiring three-phase electrical power. The disconnect switch is essentially three manual electrical knife switches mechanically linked to operate in parallel. The knife blades are independently fused and provide continuity to one of the three phases of electrical power to which they are connected. Other than the fuses, the disconnect switch has no automatic functions and is open and shut manually. The disconnect switch associated with Rod Control Power Cabinet 2-2BD is normally shut and is operated solely to provide electrical isolation to the cabinet. The disconnect switch was last operated by CPNPP personnel in support of maintenance on Rod Control Power Cabinet 2-2BD during the April 2017 2RF16 refueling outage. No maintenance activities were performed on the switch at that time.

The stationary coils associated with Rod Control Power Cabinet are part of the Rod Control System and are normally energized, fail safe (de-energized) to result in rod insertion. In the event described herein, the high resistance condition experienced on the "A" phase of the disconnect switch resulted in a low voltage condition at the stationary coils which resulted in the dropped rods.

The cause of the high resistance and overheating of the disconnect switch could not be determined.

C. SYSTEMS OR SECONDARY FUNCTIONS THAT WERE AFFECTED BY FAILURE OF COMPONENTS WITH MULTIPLE FUNCTIONS

This event did not involve systems or secondary functions which were affected by the high resistance condition identified with the disconnect switch.

D. FAILED COMPONENT INFORMATION

The failed disconnect switch was style no. 55E-5328 (catalogue no. 2528D 46 E01) provided by Westinghouse.

III. ANALYSIS OF THE EVENT

A. SAFETY SYSTEM RESPONSES THAT OCCURRED

The Reactor Protection System responded as designed to the manual trip input by the plant operators. All plant safety systems responded as designed. Automatic start of the AFW system was the expected response and the system responded as designed.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY

The event reported herein did not involve the inoperability of any safety system component or system.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

The Rod Control Power Cabinet 2-2BD three-phase fusible disconnect switch has no nuclear safety function; its purpose is to isolate power during maintenance. The high resistance experienced by this disconnect switch resulted in two control rods being dropped and necessitated a manual reactor trip. The analysis contained in FSAR 15.4.3 bounds the condition experienced: one analysis considers one or more rod control cluster assemblies (RCCAs) dropped with a given group, and a second analysis considers a dropped RCCA bank. Both cases are considered ANS condition II events (transients not accidents).

No automatic safety functions were exercised other than the expected automatic start of the Auxiliary Feedwater System and all plant safety systems responded as designed during the resultant transient. This event had no impact on nuclear safety, reactor safety, radiological safety, environmental safety or the safety of the public.

IV. CAUSE OF THE EVENT

The cause of the event was a high resistance condition associated with the electrical connection on the "A" phase of the Rod Control Power Cabinet 2-2BD stationary coil three-phase fusible disconnect switch.

V. CORRECTIVE ACTIONS

The defective switch was replaced. In accordance with the CPNPP Corrective Action Program, phase-to-phase voltage readings will be taken for the Rod Control power supplies three-phase fusible disconnect switches of both Units. A periodic maintenance activity to measure phase-to-phase voltage readings will also be developed. All proposed activities will be tracked and managed under the CPNPP Corrective Action Program.

VI. PREVIOUS SIMILAR EVENTS

There have been no similar reportable events at CPNPP in the past three years.